



REPUBLIC OF SLOVENIA
MINISTRY OF AGRICULTURE AND THE ENVIRONMENT
SLOVENIAN ENVIRONMENT AGENCY

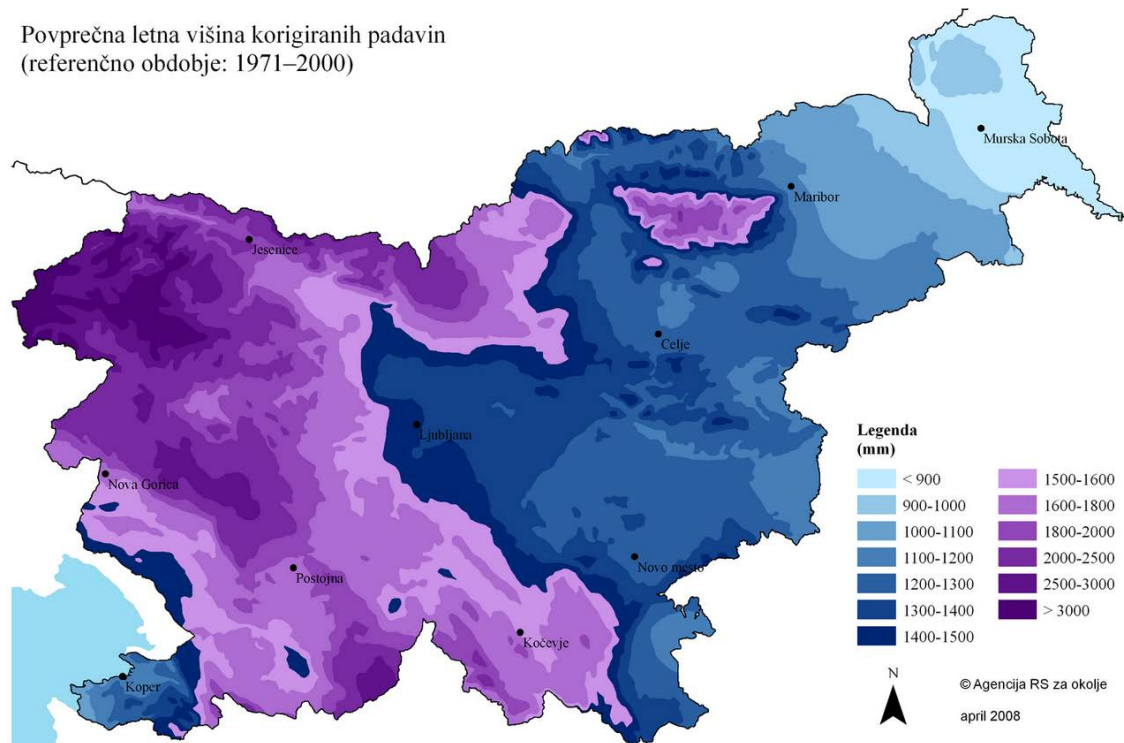
Remote sensing products for drought monitoring in Slovenia

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Training course on the use of satellite products for drought monitoring and agro-meteorological applications
Budapest , Hungary, 24-28. April.2017

Climate in Slovenia

- Slovenia has precipitation amounts in all seasons.
- In mountainous regions of western Slovenia rainfall accumulations exceeding 4000 mm/year.



Map indicating average yearly rainfall accumulations in 1971–2000 in Slovenia (M. Dolinar, Slovenian Environment Agency).

Drought severity in Slovenia

- In the last decade there have been several occurrences of severe droughts causing more than 200 million EUR of economic damage in agriculture.
- Particularly SW and NE parts of Slovenia are prone to drought impacts.
- These drought occurrences necessitate a careful monitoring of drought evolution, its severity and its spatial extent.



Application of remote sensing data –

EUMETSAT LSA SAF products (Satellite Application Facility on Land Surface Analysis)

- ✓ FVC (Fraction of Vegetation Cover) can be used to detect “green” vegetation
- ✓ LSA SAF product – spatial resolution cca 5 km
- ✓ Vineyards – one of best options form homogene cultivated area in Slovenia

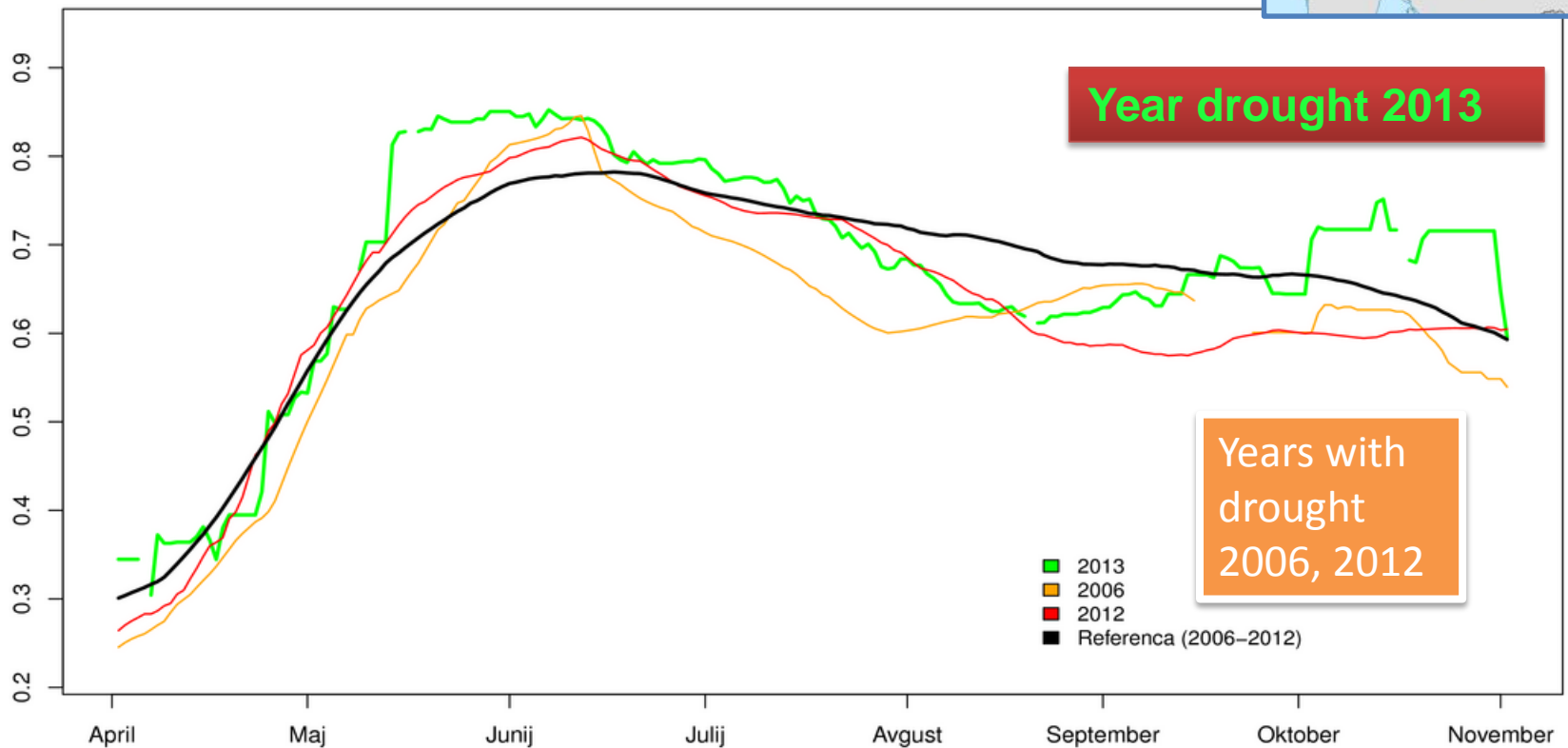


EUMETSAT LSA SAF products

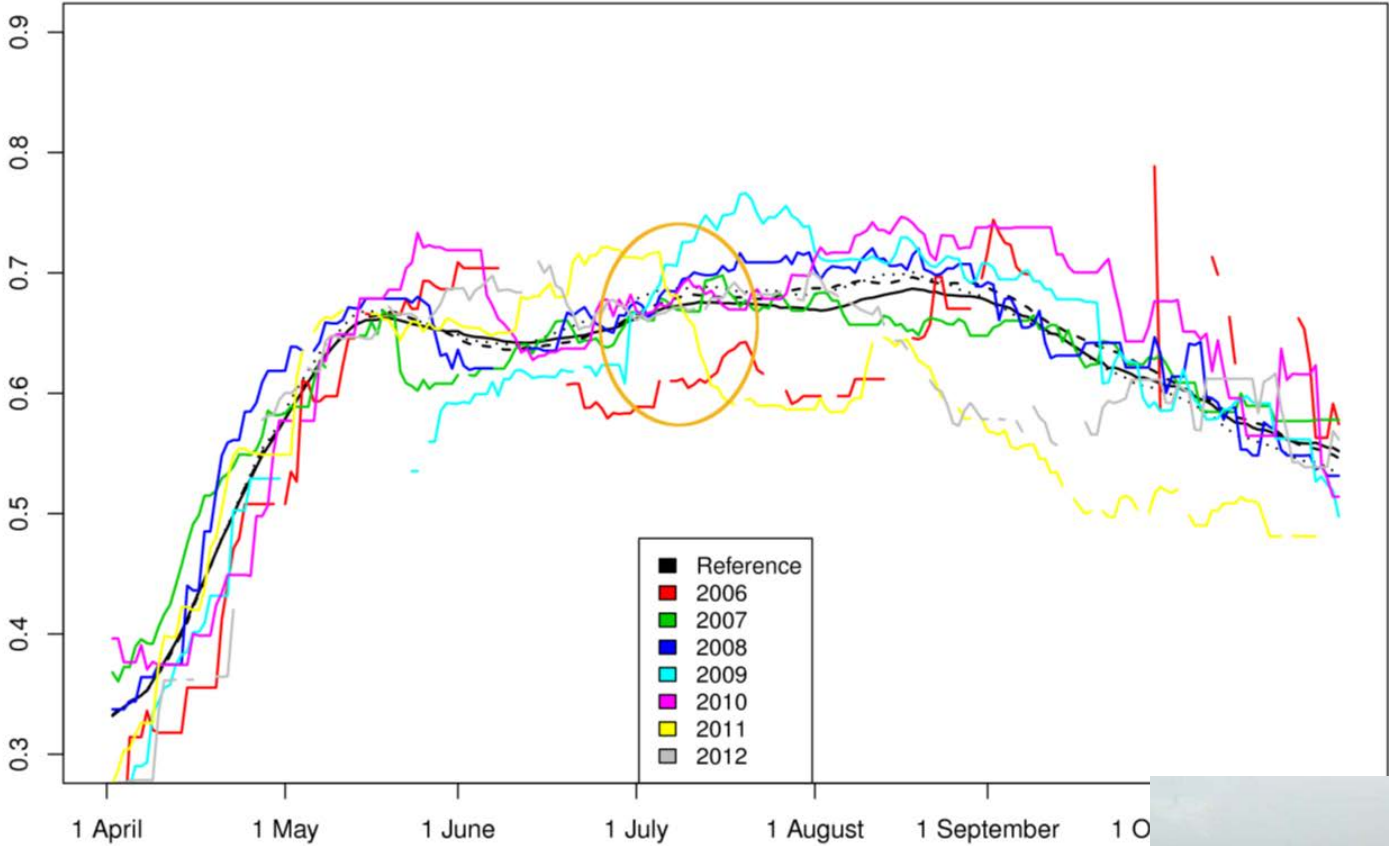
✓ reference always needed for drought detection!

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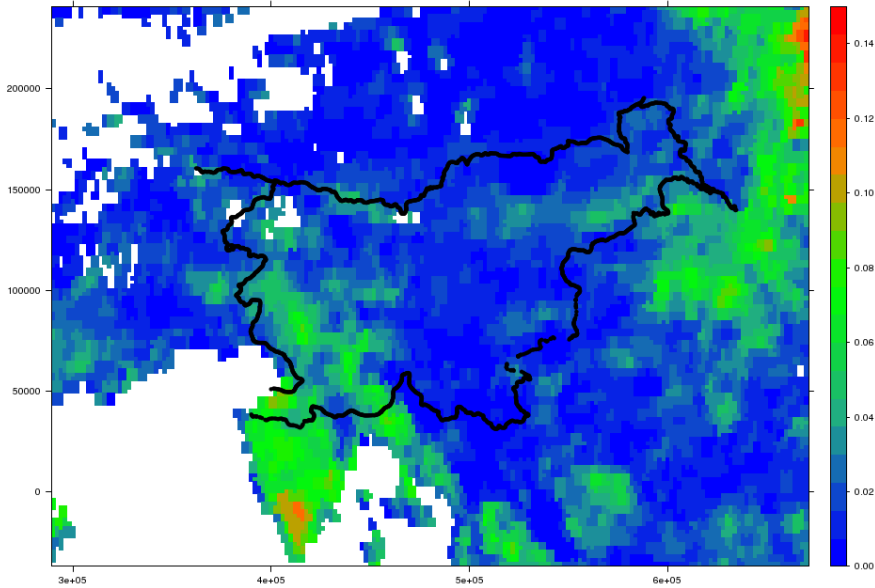
Indeks FVC: Nova Gorica (20131031)



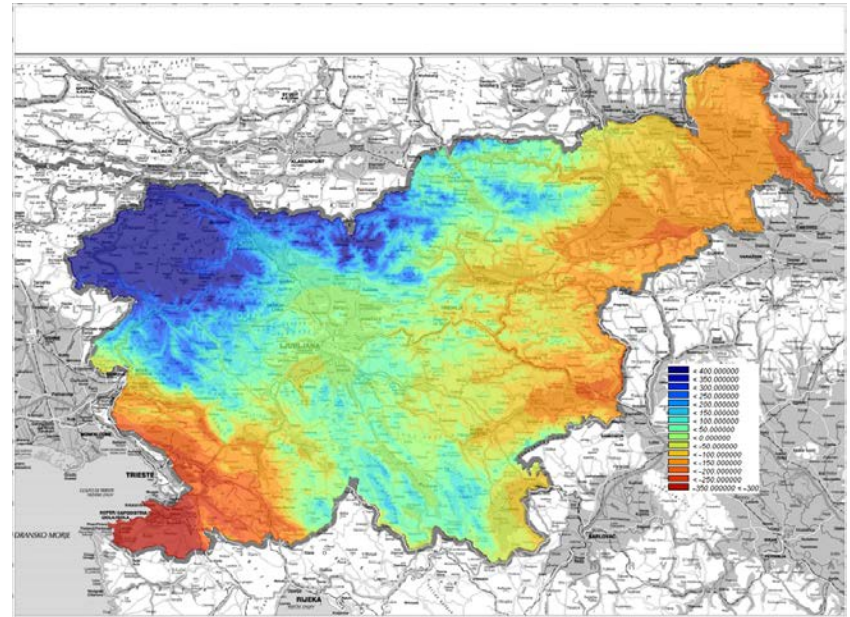
FVC: Bizeljsko



Summer FVC Accumulations (20120601 - 20120831)



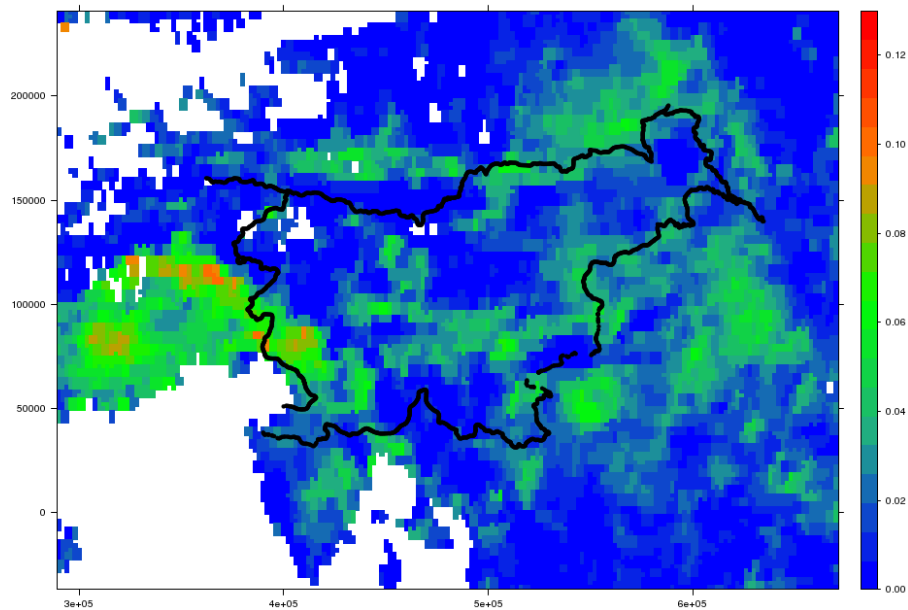
FVC anomaly accumulations in June - August 2012 over Slovenia.



Water balance in Summer 2012 over Slovenia (ARSO).

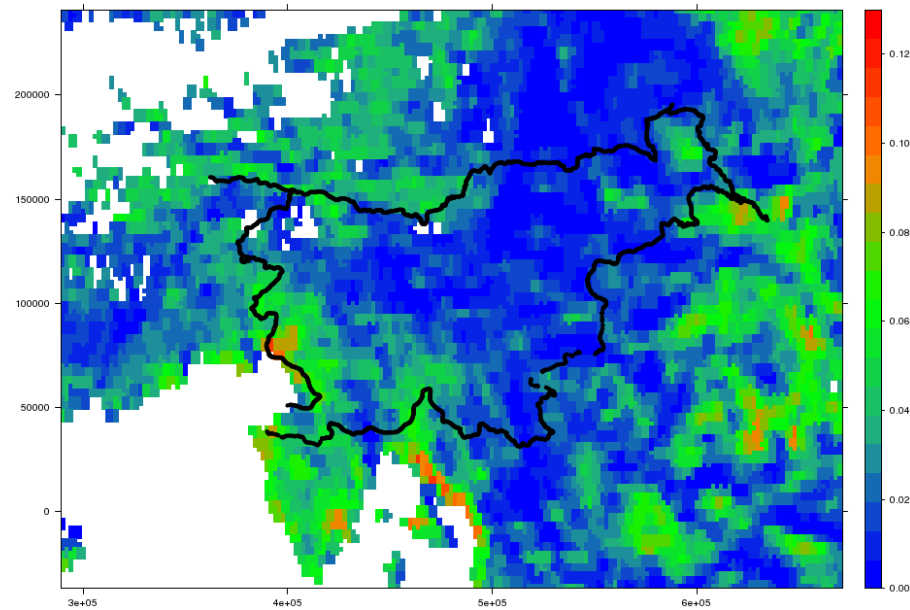
-good spatial correlation

FVC Anomaly Accumulations from 2006-06-01 to 2006-09-30



FVC anomaly accumulations over Slovenia in June-September 2006.

FVC Anomaly Accumulations from 2007-06-01 to 2007-09-30



FVC anomaly accumulations over Slovenia in June-September 2007.

Drought monitoring in Slovenia application of Copernicus LAND data



+ improved spatial resolution
(~ 300x1000m)

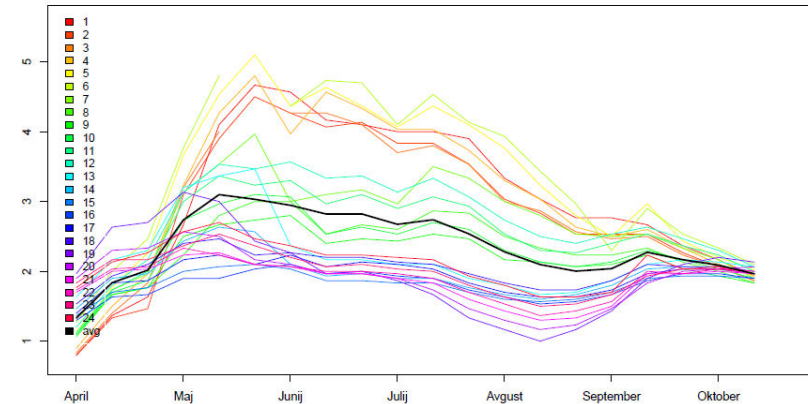
+ easier location of
homogeneous surfaces

-potential problems with large time
steps

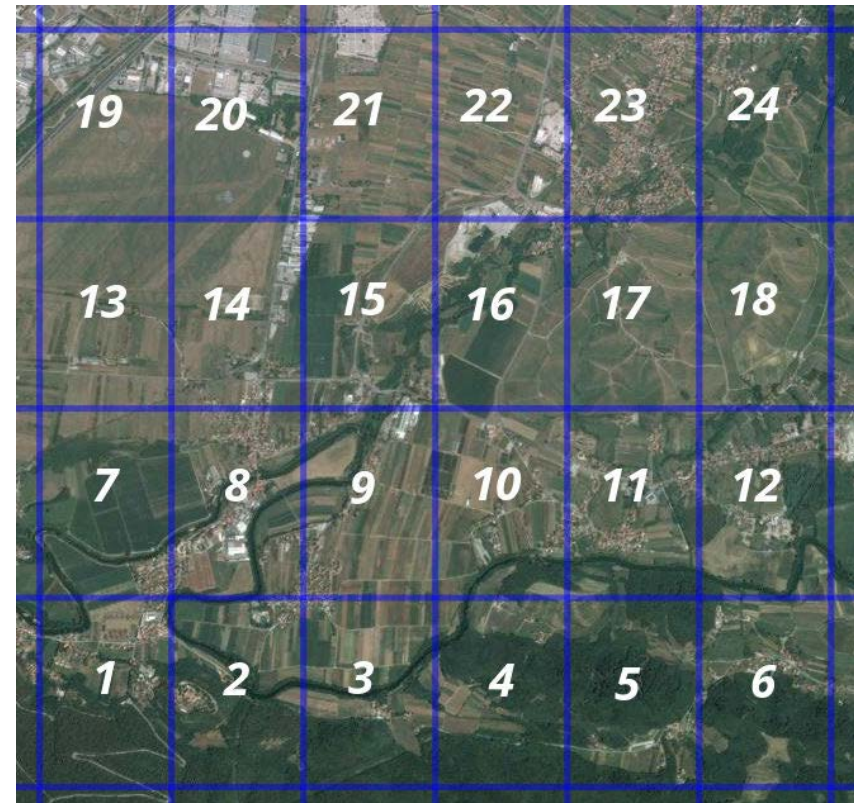
- reference under construction

Ground truth,
precision problem, time step

Indeks LAI: Nova Gorica (2013)

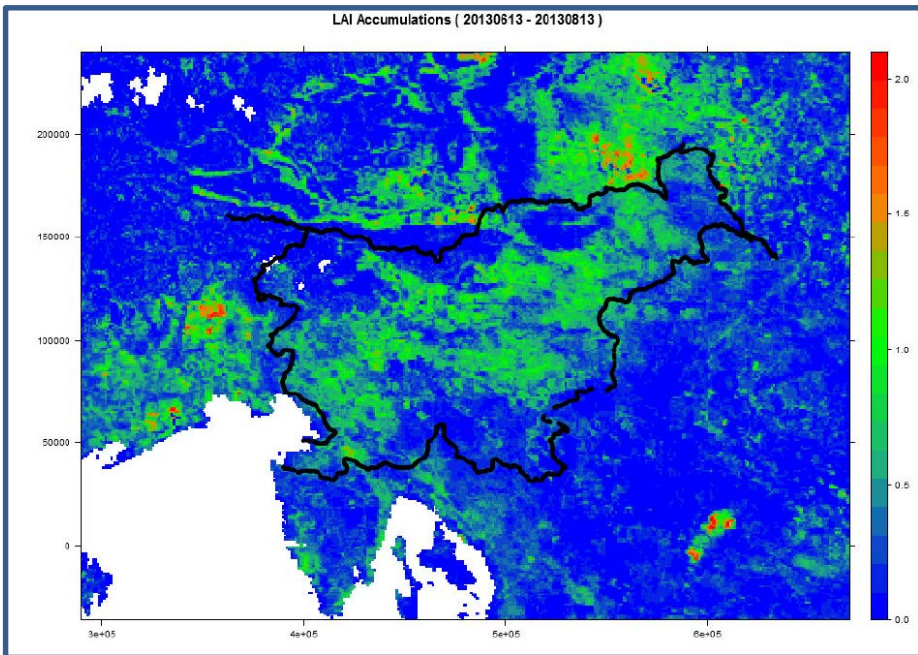


LAI time series for one corresponding LSA-SAF pixel

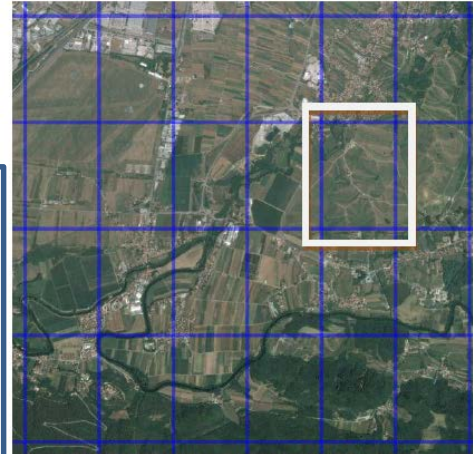


Drought monitoring in Slovenia application of Copernicus LAND data

LAI monthly average anomaly over
Slovenia, June- August 2013



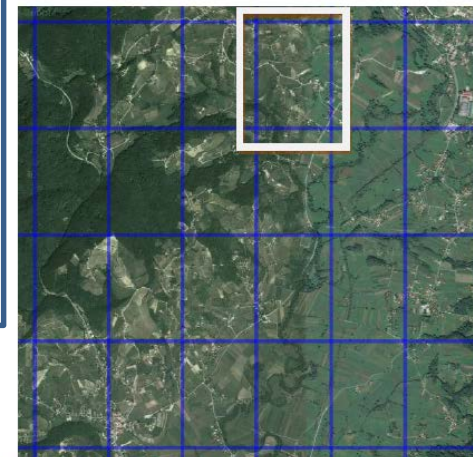
Preparation for parallel
point time series production



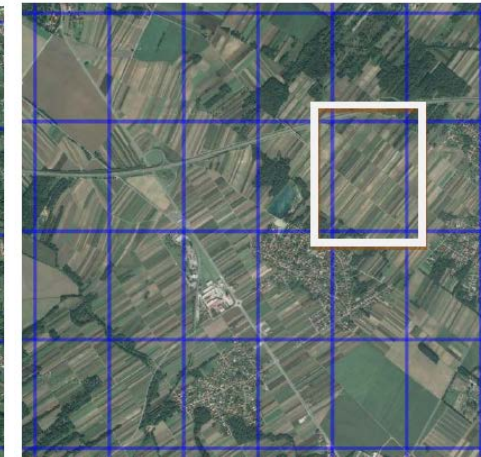
Slika 2: NOVA GORICA 45,9017° S 13,6339° V



Slika 5: MARIBOR 46,4197° S 15,7054° V



Slika 3: BIZELJSKO 46,0447° S 15,7143° V



Slika 6: MURSKA SOBOTA 46,6639° S 16,2321° V

Selection of pixels from corresponding LSA-SAF grid; two
vineyard areas (left column) and two crop growing areas
(right column)

Conclusions

- Vegetation indices found useful for monitoring possible drought-induced vegetation stress
- FVC/FCOVER and LAI preferred over NDVI (possible ground truth)
- LSA SAF valuable auxiliary information (despite coarse resolution)
- Currently, most valuable information deduced from point time series. Need for objective recognition of drought patterns

Thank you for your attention!